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WHAT IS CLAIMED IS:

1. A front-opening unified pod auto-loading structure adapted to load in a FOUP (front-opening unified pod), comprising:

a machine base, said machine base comprising a backboard,
5 a table on the middle of said backboard, and a base at a bottom side of said backboard, said backboard having an access on a upper side of said backboard;

a carriage supported on said table and adapted to carry said FOUP, said carriage having an elongated hole through top and
10 bottom sidewalls thereof;

a sliding control mechanism mounted on said table to support said carriage and controlled to move said carriage toward or away from said access;

a clamp mechanism mounted on the bottom sidewall of said
15 carriage, said clamp mechanism comprising a rail fixedly fastened to the bottom sidewall of said carriage, a screw rod disposed in parallel to the rail of said clamp mechanism, a slide threaded onto the screw rod of said clamp mechanism and adapted to move along the rail of said clamp mechanism upon rotary motion of the screw
20 rod of said clamp mechanism, a motor adapted to rotate the screw rod of said clamp mechanism clockwise/counter-clockwise, and a clamp plate fixedly mounted on the slide of said clamp mechanism and inserted through the elongated hole of said carriage and

adapted to be moved with the slide of said clamp mechanism to clamp the FOUP being carried on said carriage;

5 a horizontal shifting mechanism, said horizontal shifting mechanism comprising rail means fixedly mounted on the base of said machine base, a horizontal screw rod disposed in parallel to the rail means of said horizontal shifting mechanism, a platform threaded onto the screw rod of said horizontal shifting mechanism, and a motor drive controlled to rotate the screw rod of said horizontal shifting mechanism clockwise/counter-clockwise for
10 causing said platform to be moved horizontally along the rail means of said horizontal shifting mechanism toward/away from the backboard of said machine base; and

15 a lifting mechanism, said lifting mechanism comprising a motor and a screw rod and slide set vertically mounted on the platform of said horizontal shifting mechanism, said screw rod and slide set comprising a vertical rail, a screw rod longitudinally mounted in said vertical rail, a slide threaded onto the screw rod of said lifting mechanism and moved along said vertical rail upon rotary motion of the screw rod of said lifting mechanism.

20 2. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein further comprising a cover close/open control mechanism moved with the slide of said lifting mechanism and controlled to close/open the cover of the FOUP being carried

on said carriage.

3. The front-opening unified pod auto-loading structure as claimed in claim 2, wherein said cover close/open control mechanism comprises:

5 a gate fitting and adapted to be moved in and out of the access of said backboard of said machine base, said gate having two through holes;

two racks respectively fixedly fastened to a back sidewall of said gate, two support arms respectively extended from said
10 racks and connected to the slide of said lifting mechanism; and

a driving unit mounted on a back sidewall of said gate and controlled to close/open the cover of the front-opening unified pod being carried on said carriage, said driving unit comprising a transmission shaft, a motor controlled to rotate said transmission
15 shaft, two rotary bolts respectively coupled to said transmission shaft and inserted through the through holes of said gate and adapted for engaging into the locating holes for turning by said transmission shaft to close/open the cover of the FOUP being carried on said carriage.

20 4. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said sliding control mechanism comprises rail means, a screw rod disposed in parallel to the rail means of said shifting control mechanism, slide means threaded

onto the screw rod of said shifting control mechanism and fastened to a bottom sidewall of said carriage and adapted to move said carriage along the rail means of said sliding control mechanism upon rotary motion of the screw rod of said sliding control mechanism, and a motor controlled to rotate the screw rod of said

5 sliding control mechanism.

5. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said carriage further comprises an escape hole, a motor fixedly mounted on a bottom sidewall thereof, and a locking bolt inserted through said escape hole and coupled to the motor at said carriage and rotated by the motor at said carriage to lock the FOUP on said carriage.

6. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said carriage comprises a plurality of positioning pins adapted for engaging into respective positioning grooves on the FOUP carried thereon to hold the FOUP in position.

7. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said carriage further comprises a plurality of detection pins adapted for detecting manufacturing process stage.

8. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said carriage further comprises a plurality of detection pins adapted for detecting the type of the

FOUP being carried thereon.

9. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said backboard of said machine base comprises two parallel sliding slots longitudinally extended below
5 said table.

10. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said backboard comprises a packing member mounted around the periphery of said access at a front side.

11. The front-opening unified pod auto-loading structure as claimed in claim 3, wherein said gate comprises a packing member mounted around the periphery of a front side thereof.

12. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said gate further comprises a plurality
15 of positioning pins adapted to engage respective recessed positioning holes on the cover of the FOUP being carried on said carriage.

13. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said clamp plate of said clamp
20 mechanism comprises at least one roller disposed at a top side thereof.

14. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein said backboard of said machine base

further comprises two guide holes, and said vertical rail of said lifting mechanism comprises two guide rods backwardly extended from a back sidewall thereof and respectively inserted through the guide holes of said backboard of said machine base and adapted to
5 guide horizontal movement of said lifting mechanism with said horizontal shifting mechanism.

15. The front-opening unified pod auto-loading structure as claimed in claim 1, wherein further comprises limit switch means adapted to control forward/backward turning operation of the
10 motors of said clamp mechanism, said horizontal shifting mechanism and said lifting mechanism.

16. The front-opening unified pod auto-loading structure as claimed in claim 1 further comprising detector means mounted on said gate at a top side and adapted to detect the number and positioning of wafers in the FOUP being carried on said carriage.

17. The front-opening unified pod auto-loading structure as claimed in claim 1 further comprising detector means mounted on said backboard at a back side above said access, and adapted to detect protrusion of wafers in the FOUP being carried on said carriage.